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N° IV.

ENGLISH OPIUM.



The LARGE SILVER MEDAL was this Session given to J. W. JESTON, Esq. Surgeon, of Henley on Thames, for his Improvements in the Method of collecting ENGLISH OPIUM. The following Communication has been received from him, and Specimens of the preparations mentioned therein are placed in the Society's Repository.

SIR ;

Henley on Thames,
Jan. 30, 1823.

HAVING lately been informed that the Society for the Encouragement of Arts, Manufactures, and Commerce, had offered premiums for promoting and improving the cultivation of the *papaver somniferum*, you will oblige me by submitting to the members of your Society the present communication, which, although it does not come within the conditions of the premium this year offered, on account of the small scale on which my experiments have been conducted, yet I am induced to offer to the Society the method I have adopted in collecting opium, with a view that it may prove useful to those persons who are cultivating this plant more extensively. The plan of collecting the poppy juice immediately that it exudes from the capsule I have tried for three years and find it expeditious and effectual. I have added a comparative analysis of

English and Turkey opium. In the box will be found two cakes of opium, collected this last season ; the scarification-scoops and bottles used in collecting ; also some specimens of morphine, of narcotine, and of a very tenacious adhesive matter, &c. extracted from English opium. Allow me to add that I have tried, and now use, the English opium medicinally in my profession, and find it rather stronger and more certain in its operation than the best Turkey opium.

I remain, Sir,

To A. Aikin, Esq.

&c. &c. &c.

Secretary, &c. &c.

*J. W. JESTON, Surgeon, Henley,
and H. P. 36th Reg. of Foot.*

In April, 1816, I prepared a quarter of an acre of land in Warwickshire, by having it divided into beds, four feet and a half wide, with a foot and a half for path-ways ; these I had planted with several varieties of the *papaver somniferum* ; the seed was mixed with ashes, in the proportion of four ounces of seed to the bushel ; each bed contained seven rows of plants, nine inches asunder. The plants blossomed the end of July, and the capsules were not fit for scarifying till the middle of August. The season being extremely wet, and having been disappointed in some former experiments in gathering the opium in the usual way by allowing the juice to be inspissated on the capsules, I now tried a new method of collecting the milky tears, for which purpose I employed for my scarificator an inch and six-eighths of an old watch-spring, sharpened at both extremities, and on the four sides : this I thrust through a slice of a large wine cork, to the depth that I wished to have the heads scarified, and on one end becoming blunted, the other extremity, on being set to a proper depth, might be used ; by this means I had the

advantage of four scarificators. My collector consisted of a tin scoop, two inches and three-fourths in length, and half an inch in diameter, fixed, with a little tow and wax, into the mouth of a strong ounce-and-a-half or two-ounce phial. Armed with this scarificator and collector, I found that I could collect from one to two ounces of the milky tears of opium in the hour. My plantation consisted principally of the semi-double purple and white, the red and double varieties producing very little juice. I employed one boy daily, from August to the end of September, during which time it rained more or less every day. The quantity of dried opium collected by the boy and myself was two pounds six ounces, and 120 pounds of seed. Having ascertained by this experiment that the white and semi-double purple were the only varieties worth cultivating, and that the sooner the seed was sown in the Spring the greater the number of capsules, I, in 1821, repeated my experiments in Oxfordshire; I prepared a quarter of an acre of land by dividing it into beds as before, the land being of a light gravelly soil and poor. I this year prepared my seed by mixing four ounces of nitre in fine powder and the same quantity of seed with a bushel of ashes, and had it planted in February, by women, with blunt dibbles, five rows to a bed. The seed vegetated well. I found the worms very destructive to the early plants; but having sown a superabundance of seed (two pounds to the quarter of an acre) I secured a good crop: I had them twice thinned out, and hoed to a foot distance between every plant. They came into blossom in June, the season being favourable, with occasional showers. I employed one or two boys from the middle of July to the 10th of August. The plants had most of them from three to six capsules, and some more. I found the following plan very expeditious in collecting the

juice :—As soon as the capsules were half grown, two boys, each provided with a scarificator and scoop, taking a bed between them, scarified from ten to twenty heads, making a horizontal incision half round the upper part of the capsule; they then began to scoop off the juice, which flowed immediately, and which, if allowed to remain but a few minutes, would run off in large drops on the ground. The juice readily runs down the scoop into the bottle, which, on being filled, the scoop, after having the inside of the tube scraped out, is removed to a fresh bottle. By this mode, excepting during heavy rains, the boys can be employed collecting the whole of the day. The least adulteration of the juice is easily detected, the pure milky tears, on being emptied from the bottles, being of a white solid mass; if water or any other fluid is mixed with it, it is more or less brown, and the opium in the bottles remains liquid. I paid the boys 8*d.* per day, and gave them 1*d.* extra for every bottle of opium collected; and from this *encouragement-money*, I found the two boys did not require my constantly looking after them. The following table will show the details of each day's collecting :—

	Bottles.	Ounces of Opium.
July 18, one boy collected	4	containing 6
19, two boys do.	9	do. 13½
20, do.	10	do. 15
21, Wet all day.		
22, Sunday.		
23, Two boys do.	13	do. 19½
24, do.	12	do. 18
25, do.	11	do. 16½
26, do.	10	do. 15
27, A wet day.		
28, One boy do.	5	do. 7½

		Bottles.	Ounces of Opium.
29,	Sunday.		
30,	A wet day.		
31,	One boy collected	5	containing $7\frac{1}{2}$
Aug. 1,	do.	4	do. 6
2,	do.	4	do. 6
3,	do.	4	do. 6
4,	do.	3	do. $4\frac{1}{2}$
6,	do.	3	do. $4\frac{1}{2}$
8,	do.	3	do. $4\frac{1}{2}$
10,	do.	2	do. 3
<hr/> 16 Days		<hr/> 102 Bottles	<hr/> 153 Ounces,

or 8 pounds 15 ounces of recent opium, which, when dried, afforded 5 pounds 9 ounces of very pure opium; each head was scarified three or four times, or as long as they would bleed; and on going over the beds the second, third, and fourth times, there were many fresh capsules from the side shoots to scarify; also a quantity of dried opium was frequently collected, which had exuded after the former gatherings. Scarifying the heads too deep destroyed the seed, also the further supply of opium. I collected 170 pounds of seed in August, and extracted 30 pounds of extract from the dried capsules. I found two boys quite sufficient for the quarter of an acre. For the nitre I gave 6*d.* per pound, and used it at the rate of 8 pounds to the acre, besides ashes.

My experiment of last year did not succeed so well, owing to the dryness of the season and lightness of the soil. In February, 1822, having prepared an acre of ground by dividing it into beds of five feet width with the plough, I had it sown broad-cast with 8 pounds of seed, mixed with nitre and ashes, and raked in. The seed came up well, and very thick; but, owing to the great mildness of the preceding winter, the slugs and worms destroyed the greatest part of the

crop. The beginning of April I had it sown a second time, and this also failing, owing to the great dryness of the season, I planted half the ground with potatoes, which produced a tolerable crop. The poppy plants which succeeded grew this season from two to three feet high, and had not more than two or three capsules, whereas some plants that had stood the winter, had from six to ten capsules, growing from five to six feet high; they came into bloom in May, and afforded a very abundant supply of opium, clearly proving the advantage of the autumnal sowing. The following table will show the quantity of opium that was collected from this acre, and the short time which it produced opium. The plants came into blossom the middle of June, and I began to collect the opium on the 28th.

1822,		Bottles.	Ounces of Opium.	
June 28,	Three boys collected	15	containing	22½
29,	Four do.	23	do.	34½
30,	Sunday.			
July 1,	Four boys do.	26	do.	39
2,	do.	15	do.	22½
3,	Two do.	12	do.	18
4,	do.	11	do.	16½
5,	Wet.			
6,	Two boys part of a day	7	do.	10½
7,	Sunday.			
8,	Two boys collected	10	do.	15
9,	One boy do.	5	do.	7½
10,	do.	5	do.	7½
11,	do.	4	do.	6
12,	do.	3	do.	4½
13,	do.	2	do.	3
13 Days collecting		138 Bottles		207 Ounces

or 12 pounds 15 ounces of recent opium, which, when dried, produced 8 pounds 5 ounces of fine opium, and cost 1*l.* 10*s.* 2*d.* in collecting. It will appear from the above statement, that four boys were too many, after the first three or four days, for the half acre; the plants not being very numerous, they went over them in less than two days, I consequently, discharged two of them. One of the boys collected the first day he was employed nine ounces, and the second day eleven ounces, and had there been a sufficiency of plants the boys would every day have collected a larger quantity of opium from becoming more expert at it: the boys received the same encouragement-money as before. Every evening the bottles that were collected during the day were emptied into shallow tin pans, 14 inches by 10; these I placed in the garden, sheltered from the rain, and, by stirring the opium once or twice a day, it soon dried sufficiently to be formed into cakes of two pounds weight each. After the opium had been in the pans a few days, they were placed one over the other, cross-ways, by that means taking up very little space, and having a current of air between each pan. I found the leaves of the large palmated rhubarb a very clean and convenient covering for the cakes, which by preventing them sticking together allowed of their drying sooner. One pound of the poppy-juice I dried over a water-bath. Although the opium was quite thick before heat was applied, it soon became fluid and watery, and afterwards dried up into a very dark brittle mass. By attending in the field occasionally myself, I found that there was one variety of the white poppy with high crowns and smooth capsules, growing from 4 to 12 heads, and producing a much larger quantity of milky tears than the common white poppy: the seed of some of these I have selected for my future experiments.

I am inclined to think that there is still much information to be gained before the cultivation of this important plant can be brought to perfection in this country, in selecting the seed, the best time for sowing, and the preparation of the soil ; but I hope that the encouragement that has been given by your very excellent Society will soon surmount all difficulties. The poppy has a tap root, is a very hardy plant, flourishing best in a loamy soil. Last September I had two acres drilled with poppy seed, the rows rather more than a foot apart, and although the plants are small, yet the severe frost has not apparently injured them. I am now trying the effect of ashes, lime, and nitre, and short stable dung, as top-dressings to three different parts of the field. There is a double advantage in having an autumnal as well as a spring crop, by allowing a longer period for the collectors to gather the opium. The produce of the last crop, besides opium, was 320 pounds of seed, which, on being pressed, will give from 12 to 13 gallons of oil, and 180 pounds of oil cake. I have found the poppy stems useful in lighting fires, 1,000 pounds of stems producing 95 pounds of ashes, and 7 pounds of potass mixed with sulphate of potass ; the residuum consisted of 5 parts calcareous matter, and one of silex, carbon and insoluble substances.

The following analysis was undertaken to ascertain if any difference existed between the best Turkey and English opium, and in what that consisted. After many experiments for the last two years, which I feel much pleasure in laying before the members of the Society, I find that England need no longer be indebted to Turkey, or the East Indies, for this valuable drug, her own soil and clime being capable of producing poppies containing all the active ingredients of the very best Turkey opium.

In my analysis I found English opium contained a larger quantity of morphine, or gummy extract, and of narcotine, or resinous extract, but a much less quantity of the inactive ingredients, viz. ceroma, or waxy principle (soluble in boiling spirits, and separating from it whilst cooling), and a very adhesive, tenacious matter, insoluble in spirits of wine, but readily so in æther and the essential oils, resembling in many of its properties caoutchouc. The insoluble remains of Turkey and English opium, consisting of gluten and earthy matter, are much the same.

The opium which I used for my experiments was thoroughly dried, and in powder, common opium losing from 40 to 60 grains in an ounce whilst drying.

The insoluble matter was collected and weighed very exactly in these experiments, for I frequently found much difficulty in reducing the extracts to the same exact degree of dryness; and sometimes they would exceed the original weight of opium when added to the insoluble parts, owing to a small quantity of moisture being still very tenaciously retained, even when reduced to powder, which gave the result the appearance of being incorrect.

EXPERIMENT THE FIRST.	ENGLISH OPIUM.	TURKEY OPIUM.
	<i>Grains.</i>	<i>Grains.</i>
480 grains (one ounce) of Opium, in powder, was dissolved in two pints of cold water; after macerating for several days, it was strained, and the residue was repeatedly boiled in fresh water, till the fluid passed the filter colourless: on evaporating these different fluids and drying the extract, I obtained	360	334

	ENGLISH OPIUM.	TURKEY OPIUM.
Whilst this watery infusion was evaporating, a quantity of resinous looking matter separated, and subsided to the bottom of the pan in the form of very minute crystals.	<i>Grains.</i>	<i>Grains.</i>
The residuum insoluble in water was boiled in three ounces of spirit of wine, and filtered; on cooling, it deposited several grains of ceroma, of a light yellow colour, tasteless, and of the consistence of butter. This I separated before the fluid was quite cold, to prevent its adhering to the crystals, which soon began to shoot from the sides of the bottle, and which continued to enlarge for several days. On more spirit being boiled with the residue, it still deposited ceroma, but the fluid did not afford any more crystals. The spirit dissolved of ceroma ..	120	146
Of resinous extract in crystals	5	4
Of resinous matter not easily crystalised	7	Not any.
The insoluble residuum, on being dried, weighed and possessed the singular property of becoming highly electrified, on being rubbed in a mortar; so much so, that it was with some difficulty collected together again: this property was destroyed by boiling it in oil of turpentine, which dissolved of a substance like caoutchouc	42	47
Leaving a light brown, earthy, insoluble powder, weighing	66	95
A paper of this powder was folded together, and placed on a stove to dry; before the covering was much scorched, it took fire, and burnt like pyrophorous made from alum and carbon, spreading an intolerable stench of burnt horn or animal matter.	21	41
The extract of 360 grains, obtained by evaporating the watery solution was mixed with three ounces of æther, one ounce being digested on it at a time; the two first quantities deposited crys-	46	54

	ENGLISH OPIUM.	TURKEY OPIUM.
tals on the sides of the bottle ; the third did not ; the æther, on being evaporated, left a mass of narcotine which, on dissolving in spirit, produced fine crystals.	<i>Grains.</i> 34	<i>Grains.</i> 20
The remaining gummy extract consisted of pure morphine, and weighed	326	314
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EXPERIMENT THE SECOND.		
480 grains of Opium, in powder, was dissolved in one pint of rectified spirit of wine ; after macerating several days, it was strained, and fresh spirit boiled with the residue, till the spirit passed the filter tasteless : it dissolved	384	366
Leaving an undissolved residuum of	96	114
This residuum boiled in water, dissolved of gummy extract	23	25
Leaving a Residuum of	73	89
The residuum of 73 grains was boiled in oil of turpentine, and the insoluble matter, after having been separated from the oil and dried, weighed	32	52
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EXPERIMENT THE THIRD.		
480 grains of Opium was digested in 13 ounces of proof spirit, and strained ; fresh quantities of proof spirit were boiled with the residuum as long as it appeared to take up any of the opium : it dissolved	388	366

	ENGLISH OPIUM.	TURKEY OPIUM.
	<i>Grains.</i>	<i>Grains.</i>
Leaving a residuum of	92	114
On boiling the residuum in oil of turpentine, it dissolved	54 $\frac{1}{2}$	74
Leaving a residue of insoluble matter	38	40
And in one specimen of very fine Turkey Opium, proof spirit dissolved 360 grains, leaving a residue of 120 grains, of which oil of turpentine dissolved 90 grains of this caoutchouc substance, leaving only 30 grains of insoluble matter.		
In making the tincture with opium that had been dried over a water-bath, proof spirit dissolved	320	
Leaving a residue of insoluble matter	160	
This tincture was placed on a warm stove whilst making, and on cooling it deposited the specimen of impure narcotine crystals sent for examination.		
EXPERIMENT THE FOURTH.		
480 grains of Opium, in powder, was macerated in two pints of common distilled vinegar; fresh quantities of acetic acid were boiled with the residuum till it passed the filter colourless: it dissolved	388	348
Leaving a residuum of	92	132
Oil of turpentine, being boiled on this residue dissolved	46	88

	ENGLISH OPIUM.	TURKEY OPIUM.
	<i>Grains.</i>	<i>Grains.</i>
Leaving a residue of gluten and insoluble matter of	46	44
The acetate of opium was saturated with water of pure ammonia, and produced a grey precipitate of narcotine, very slow in subsiding to the bottom of the bottle, weighing	104	64
On re-dissolving it in spirit of wine, very fine crystals are deposited from it whilst cooling.		
The fluid, after separating the narcotine, is not easily evaporated to dryness, but contains of morphine, or gummy extract	284	284

Five grains of narcotine may be obtained from every ounce of English tincture of opium by mixing an equal quantity of water of ammonia with it. It may also be obtained by boiling spirit with the residuum after making the tincture of opium. It appears to contain powerful properties; the crystals are very light, and on opening papers of them incautiously, I have found them occasion a peculiarly unpleasant sensation in the nose and throat.

Narcotine is sparingly soluble in boiling water, but readily so in æther, the essential oils, boiling acetic acid, and spirit of wine, which on cooling affords a portion of the resin in fine white crystals, which appears to be the resinous part of opium, quite pure, and unmixed either with the ceroma or caoutchouc; a small quantity of these substances, particularly the ceroma, converting the crystals into a resinous mass, not easily again crystallised. Its solution does not perceptibly affect turmeric paper; but litmus paper, that has been soaked in weak solution of potass or lime-water, is slightly reddened, in the same manner as by the tincture of benzoin. Tolu, shell lac, mastic, and

some other resinous tinctures which I have tried, alter the colour of litmus paper. I obtained the same results with æther and spirit, but I used the oil of turpentine in these experiments to save the great expense attending the repeating them frequently with spirit. On evaporating the oil of turpentine it left the caoutchouc-substance of the appearance of a very tenacious bird-lime, entirely soluble in æther.

The morphine I have given medicinally with the happiest results. Many persons who from some peculiarity of constitution could not take laudanum have derived much benefit from this preparation, without suffering the usual unpleasant effects from opium. I find one grain of morphine is equal to one and a half of common opium.

I have adopted the terms morphine and narcotine from having met with them in a paper in the Medical Records for June, 1821, wherein Robiquet has called the gummy extract *morphine*, from supposing it contained the anodyne and composing principles; and the resinous, crystalline mass, *narcotine*, from possessing the stimulating and stupifying principle.

I have to apologize to the Society for having occupied so much of their valuable time; but I trust that the importance of the subject will be a sufficient excuse.

I am, &c. &c.

J. WARD JESTON, *Surgeon, Henley,*
and H. P. 36th Regt. of Foot.



[The wood-cut here annexed represents the scoop and bottle mentioned in the former part of this communication.]

CERTIFICATE

DEAR SIR;

Henley on Thames,
Jan. 28, 1823.

I FEEL great pleasure in stating I frequently visited your plantation of poppies during last summer, and that I saw and much admired your very simple, but excellent plan of collecting the opium from the plants.

I am, Sir,

To J. W. Jeston, Esq.

&c. &c. &c.

PARIS DICK, M. D.

Nº V.

EARLY HORSE-BEANS.

The LARGE SILVER MEDAL, being the Premium offered, was this Session given to W. PYLE TAUNTON, Esq. of Cheam, for an EARLY VARIETY OF HORSE-BEAN. The following Communications were received from him on the Subject.

GENTLEMEN;

3, Pump-court, Temple.

PERCEIVING that you have offered a premium for the cultivation of any species of beans which shall be cleared off the ground, ripe, before the middle of August, I take the liberty to submit to your consideration my humble pretensions as a claimant of that premium, in respect of the cultivation of the winter bean; a variety which I have not met with in England, in the hands of any other agriculturist; nor can I